CHAPTER 16 - STRUCTURAL DESIGN

2001 CBC	PROPOSED ADOPTION	OSHPD		Comments
		2	3	
	Adopt entire chapter without amendments		X	
	Adopt entire chapter with amendments listed below	X		
	Adopt only those sections listed below			
	1601.2 CA	X		
	1601.3 CA	X		
1641A CA	*1602.1*	X		Relocated existing California Building Standards into IBC format
	1603.1	X		
1632.1	*1605.3.2*	X		Relocated existing California Building Standards into IBC format
Table 16-B	*1607.1, Table 1607.1*	X		Relocated existing California Building Standards into IBC format
	1609.1.1 CA	X		
1619	*1609.4*	X		Relocated existing California Building Standards into IBC format.
	1612.3	X		
	1612.5	X		
	1613.1	X		
	1613.5.1	X		
	1613.5.6	X		
	1613.5.6.1	X		Not permitted
	1613.5.6.2	X		

REPEAL OF EXISTING CALIFORNIA AMENDMENTS IN PART OR IN WHOLE THAT ARE NO LONGER NECESSARY AS FOLLOWS:

2001 CBC DIVISION I – GENERAL DESIGN REQUIREMENTS

2001 CBC SECTION 1611 – OTHER MINIMUM LOADS: Repeal amendment in the following subsection.
~~*1611.5*~~.

2001 CBC SECTION 1612 – COMBINATIONS OF LOADS: Repeal amendment in the following subsection.

~~*1612.2.1*~~.

2001 CBC DIVISION IV – EARTHQUAKE DESIGN

~~2001 CBC SECTION 1632 – LATERAL FORCE ON ELEMENTS OF STRUCTURES, NONSTRUCTURAL COMPONENTS AND EQUIPMENT SUPPORTED BY STRUCTURES:~~ Repeal all amendments in this section.

2001 CBC DIVISION V – SOIL PROFILE TYPES AND SITE DATA FOR HEALTH FACILITIES

~~*2001 CBC SECTION 1636 – SITE CATEGORIZATION PROCEDURE AND SITE DATA FOR HEALTH FACILITIES*~~: Repeal all amendments in this section.

~~*Table 160B:*~~ Item # 6.1.

Notation [For OSHPD]:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275 and 129850

EXPRESS TERMS

SECTION 1601 GENERAL

1601.1 Scope. The provisions of this chapter shall govern the structural design of buildings, structures and portions thereof regulated by this code.

1601.2 [For OSHPD 2] References. *All referenced codes and standards listed in Chapter 35 shall include all the modifications contained in this code to referenced standards. In the event of any discrepancy between this code and a referenced standard, refer to Section 101.7*

1601.3 [For OSHPD 2] Enforcement Agency Approval.. *In addition to requirements of CCR Title 24, Parts 1 & 2, any aspect of project design, construction, quality assurance, or quality control programs for which this code requires approval by the design professional, are also subject to approval by the enforcement agency.*

Notation [For OSHPD]:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275 and 129850

SECTION 1602 DEFINITIONS AND NOTATIONS

1602.1 Definitions. The following words and terms shall, for the purposes of this chapter, have the meanings shown herein.
ALLOWABLE STRESS DESIGN. A method of proportioning structural members, such that elastically computed stresses produced in the members by nominal loads do not exceed specified allowable stresses (also called "working stress design").

BALCONY, EXTERIOR. An exterior floor projecting from and supported by a structure without additional independent supports.

DEAD LOADS. The weight of materials of construction incorporated into the building, including but not limited to walls, floors, roofs, ceilings, stairways, built-in partitions, finishes, cladding and other similarly incorporated architectural and structural items, and the weight of fixed service equipment, such as cranes, plumbing stacks and risers, electrical feeders, heating, ventilating and air-conditioning systems and fire sprinkler systems.

DECK. An exterior floor supported on at least two opposing sides by an adjacent structure, and/or posts, piers or other independent supports.

DESIGN STRENGTH. The product of the nominal strength and a resistance factor (or strength reduction factor).

DIAPHRAGM. A horizontal or sloped system acting to transmit lateral forces to the vertical-resisting elements. When the term

"diaphragm" is used, it shall include horizontal bracing systems.
Diaphragm, blocked. In light-frame construction, a diaphragm in which all sheathing edges not occurring on a framing member are supported on and fastened to blocking.
Diaphragm boundary. In light-frame construction, a location where shear is transferred into or out of the diaphragm sheathing. Transfer is either to a boundary element or to another force-resisting element.
Diaphragm chord. A diaphragm boundary element perpendicular to the applied load that is assumed to take axial stresses due to the diaphragm moment.
Diaphragm flexible. A diaphragm is flexible for the purpose of distribution of story shear and torsional moment where so indicated in Section 12.3.1 of ASCE 7, as modified in Section 1613.6.1.
Diaphragm, rigid. A diaphragm is rigid for the purpose of distribution of story shear and torsional moment when the lateral deformation of the diaphragm is less than or equal to two times the average story drift.

DURATION OF LOAD. The period of continuous application of a given load, or the aggregate of periods of intermittent applications of the same load.

(Relocated from 1641A.1, 2001 CBC) *[For OSHPD 2]* ***ENFORCEMENT AGENT.*** *That individual within the agency or organization charged with responsibility for agency or organization compliance with the requirements of ~~Division VI-R~~ this Code. Used interchangeably with Building Official or Code Official.*

ESSENTIAL FACILITIES. Buildings and other structures that are intended to remain operational in the event of extreme environmental loading from flood, wind, snow or earthquakes.

FABRIC PARTITIONS. A partition consisting of a finished surface made of fabric, without a continuous rigid backing, that is directly attached to a framing system in which the vertical framing members are spaced greater than 4 feet (1219 mm) on center.

FACTORED LOAD. The product of a nominal load and a load factor.

GUARD. See Section 1002.1.

IMPACT LOAD. The load resulting from moving machinery, elevators, craneways, vehicles and other similar forces and kinetic loads, pressure and possible surcharge from fixed or moving loads.

LIMIT STATE. A condition beyond which a structure or member becomes unfit for service and is judged to be no longer useful for its intended function (serviceability limit state) or to be unsafe (strength limit state).

LIVE LOADS. Those loads produced by the use and occupancy of the building or other structure and do not include construction or environmental loads such as wind load, snow load, rain load, earthquake load, flood load or dead load.

LIVE LOADS (ROOF). Those loads produced (1) during maintenance by workers, equipment and materials; and (2) during the life of the structure by movable objects such as planters and by people.

LOAD AND RESISTANCE FACTOR DESIGN (LRFD). A method of proportioning structural members and their connections using load and resistance factors such that no applicable limit state is reached when the structure is subjected to appropriate load combinations. The term "LRFD" is used in the design of steel and wood structures.

LOAD EFFECTS. Forces and deformations produced in structural members by the applied loads.

LOAD FACTOR. A factor that accounts for deviations of the actual load from the nominal load, for uncertainties in the analysis that transforms the load into a load effect, and for the probability that more than one extreme load will occur simultaneously.

LOADS. Forces or other actions that result from the weight of building materials, occupants and their possessions, environmental effects, differential movement and restrained dimensional changes. Permanent loads are those loads in which variations over time are rare or of small magnitude, such as dead loads. All other loads are variable loads (see also "Nominal loads").

NOMINAL LOADS. The magnitudes of the loads specified in this chapter (dead, live, soil, wind, snow, rain, flood and earthquake).

OCCUPANCY CATEGORY. A category used to determine structural requirements based on occupancy.

OTHER STRUCTURES. Structures, other than buildings, for which loads are specified in this chapter.

PANEL (PART OF A STRUCTURE). The section of a floor, wall or roof comprised between the supporting frame of two adjacent rows of columns and girders or column bands of floor or roof construction.

RESISTANCE FACTOR. A factor that accounts for deviations of the actual strength from the nominal strength and the manner and consequences of failure (also called "strength reduction factor").

STRENGTH, NOMINAL. The capacity of a structure or member to resist the effects of loads, as determined by computations using specified material strengths and dimensions and equations derived from accepted principles of structural mechanics or by field tests or laboratory tests of scaled models, allowing for modeling effects and differences between laboratory and field conditions.

STRENGTH, REQUIRED. Strength of a member, cross section or connection required to resist factored loads or related internal moments and forces in such combinations as stipulated by these provisions.

STRENGTH DESIGN. A method of proportioning structural members such that the computed forces produced in the members by factored loads do not exceed the member design strength [also called "load and resistance factor design" (LRFD)]. The term "strength design" is used in the design of concrete and masonry structural elements.

VEHICLE BARRIER SYSTEM. A system of building components near open sides of a garage floor or ramp or building walls that act as restraints for vehicles.

NOTATIONS.

D = Dead load.

E = Combined effect of horizontal and vertical earthquake induced forces as defined in Section 12.4.2 of ASCE 7.

E_m = Maximum seismic load effect of horizontal and vertical seismic forces as set forth in Section 12.4.3 of ASCE 7.

F = Load due to fluids with well-defined pressures and maximum heights.

F_a = Flood load.

H = Load due to lateral earth pressures, ground water pressure or pressure of bulk materials.

L = Live load, except roof live load, including any permitted live load reduction.

L_r = Roof live load including any permitted live load reduction.

R = Rain load.

S = Snow load.

T = Self-straining force arising from contraction or expansion resulting from temperature change, shrinkage, moisture change, creep in component materials, movement due to differential settlement or combinations thereof.

W = Load due to wind pressure.

Notation [For OSHPD]:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275 and 129850

SECTION 1603 CONSTRUCTION DOCUMENTS

1603.1 General. Construction documents shall show the size, section and relative locations of structural members with floor levels, column centers and offsets dimensioned. The design loads and other information pertinent to the structural design required by Sections 1603.1.1 through 1603.1.~~8~~ **9** shall be indicated on the construction documents.

[For OSHPD 2] Additional requirements are included in Section 7-115 and 7-125 of the Building Standards Administration Code (Part 1, Title 24, C.C.R).

Exception: Construction documents for buildings constructed in accordance with the conventional light-frame construction provisions of Section 2308 shall indicate the following structural design information:

1. Floor and roof live loads.
2. Ground snow load, P_g.
3. Basic wind speed (3-second gust), miles per hour (mph) (km/hr) and wind exposure.
4. Seismic design category and site class.
5. Flood design data, if located in flood hazard areas established in Section 1612.3.

Notation [For OSHPD]:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275 and 129850

SECTION 1605 LOAD COMBINATIONS

1605.1 General. Buildings and other structures and portions thereof shall be designed to resist the load combinations specified in Section 1605.2 or 1605.3 and Chapters 18 through 23, and the special seismic load combinations of Section 1605.4 where required by Section 12.3.3.3 or 12.10.2.1 of ASCE 7. Applicable loads shall be considered, including both earthquake and wind, in accordance with the specified load combinations. Each load combination shall also be investigated with one or more of the variable loads set to zero.

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1605.3 Load combinations using allowable stress design.

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1605.3.2 Alternative basic load combinations. In lieu of the basic load combinations specified in Section 1605.3.1, structures and portions thereof shall be permitted to be designed for the most critical effects resulting from the following combinations. When using these alternative basic load combinations that include wind or seismic loads, allowable stresses are permitted to be increased or load combinations reduced where permitted by the material chapter of this code or the referenced standards. For load combinations that include the counteracting effects of dead and wind loads, only two-thirds of the minimum dead load likely to be in place during a design wind event shall be used. Where wind loads are calculated in accordance with Chapter 6 of ASCE 7, the coefficient ω in the following equations shall be taken as 1.3. For other wind loads, ω shall be taken as 1. When using these alternative load combinations to evaluate sliding, overturning and soil bearing at the soil-structure interface, the reduction of foundation overturning from Section 12.13.4 in ASCE 7 shall not be used. When using these alternative basic load combinations for proportioning foundations for loadings, which include seismic loads, the vertical seismic load effect, E_v, in Equation 12.4-4 of ASCE 7 is permitted to be taken equal to zero.

> *Exception: **(Relocated from 1632.1, 2001 CBC)** [For OSHPD 2] Intermittent connections such as inserts for anchorage of nonstructural components shall not be allowed the one-third increase in allowable stresses.*

$D + L + (L_r \text{or } S \text{ or } R)$

(Equation 16-16)

$D + L + (\omega W)$

(Equation 16-17)

$D + L + \omega W + S/2$

(Equation 16-18)

$D + L + S + \omega W/2$

(Equation 16-19)

$D + L + S + E/1.4$

(Equation 16-20)

$0.9D + E/1.4$

(Equation 16-21)

Exceptions:

1. Crane hook loads need not be combined with roof live loads or with more than three-fourths of the snow load or one-half of the wind load.
2. Flat roof snow loads of 30 psf (1.44 kN/m^2) or less need not be combined with seismic loads. Where flat roof snow loads exceed 30 psf (1.44 kN/m^2), 20 percent shall be combined with seismic loads.

Notation [For OSHPD]:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275 and 129850

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SECTION 1607 LIVE LOADS

1607.1 General. Live loads are those loads defined in Section 1602.1.

TABLE 1607.1 MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS AND MINIMUM CONCENTRATED LIVE LOADS[g]

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (lbs.)
1.Apartments (see residential)	—	—
2.Access floor systems Office use Computer use	 50 100	 2,000 2,000
3.Armories and drill rooms	150	—
4.Assembly areas and theaters Fixed seats (fastened to floor) Follow spot, projections and control rooms Lobbies Movable seats Stages and platforms	 60 50 100 100 125	—
5.Balconies On one- and two-family residences only, and not exceeding 100 sq ft	100 60	—
6.Catwalks	40	300
7.Decks	Same as occupancy served[h]	—

8.Bowling alleys	75	—
9.Cornices	60	—
10.Corridors, except as otherwise indicated	100	—
11.Dance halls and ballrooms	100	—
OCCUPANCY OR USE	**UNIFORM (psf)**	**CONCENTRATED (lbs.)**
12.Dining rooms and restaurants	100	—
13.Dwellings (see residential)	—	—
14.Elevator machine room grating (on area of 4 in^2)	—	300
15.Finish light floor plate construction (on area of 1 in^2)	— —	200
16.Fire escapes On single-family dwellings only	100 40	—
17.Garages (passenger vehicles only) Trucks and buses	40 Note a See Section 1607.6	
18.Grandstands (see stadium and arena bleachers)	—	—
19.Gymnasiums, main floors and balconies	100	—
20.Handrails, guards and grab bars	See Section 1607.7	
21.Hospitals Corridors above first floor Operating rooms, laboratories Patient rooms	80 60 40	1,000 1,000 1,000
22.Hotels (see residential)	—	—
23.Libraries Corridors above first floor Reading rooms Stack rooms	80 60 150[b]	1,000 1,000 1,000
24.Manufacturing Heavy Light	250 125	3,000 2,000
25.Marquees	75	—
26.Office buildings Corridors above first floor File and computer rooms shall be designed for heavier loads based on anticipated occupancy Lobbies and first-floor corridors Offices	80 — 100 50	2,000 — 2,000 2,000
27.Penal institutions Cell blocks Corridors	40 100	—

28.Residential One- and two-family dwellings Uninhabitable attics without storage[i] Uninhabitable attics with limited storage[i, j, k] Habitable attics and sleeping areas All other areas except balconies and decks Hotels and multiple-family dwellings Private rooms and corridors serving them Public rooms and corridors serving them	 10 20 30 40 40 100	—
OCCUPANCY OR USE	**UNIFORM (psf)**	**CONCENTRATED (lbs.)**
29.Reviewing stands, grandstands and bleachers	Note c	
30.Roofs All roof surfaces subject to maintenance workers Awnings and canopies Fabric construction supported by a lightweight rigid skeleton structure All other construction Ordinary flat, pitched, and curved roofs Primary roof members, exposed to a work floor Single panel point of lower chord of roof trusses or any point along primary structural members supporting roofs: Over manufacturing, storage warehouses, and repair garages All other occupancies Roofs used for other special purposes Roofs used for promenade purposes Roofs used for roof gardens or assembly purposes	 5 nonreduceable 20 20 Note 1 60 100	 300 2,000 300 Note 1
31.Schools Classrooms Corridors above first floor First-floor corridors	 40 80 100	 1,000 1,000 1,000
32.Scuttles, skylight ribs and accessible ceilings	—	200
33.Sidewalks, vehicular driveways and yards, subject to trucking	250[d]	8,000[e]
34.Skating rinks	100	—
35.Stadiums and arenas Bleachers Fixed seats (fastened to floor)	 100[c] 60[c]	 —
36.Stairs and exits One- and two-family dwellings All other	 40 100	 Note f
37.Storage warehouses (shall be designed for heavier loads if required for anticipated storage) Heavy Light	 250 125	
38.Stores Retail First floor Upper floors Wholesale, all floors	 100 75 125	 1,000 1,000 1,000
39.Vehicle barriers	See Section 1607.7.7.3	

40.Walkways and elevated platforms (other than exitways)	60	—
41.Yards and terraces, pedestrians	100	—
*42. **(Relocated from Table 16-B, 2001 CBC)** [For OSHPD 2] Storage racks and wall-hung cabinets.*	*Total Loads[m]*	

For SI: 1 inch = 25.4 mm, 1 square inch = 645.16 $mm^2$1 square foot = 0.0929 m^2, 1 pound per square foot = 0.0479 kN/m^2, 1 pound = 0.004448 kN, 1 pound per cubic foot = 16 kg/m^3

a. Floors in garages or portions of buildings used for the storage of motor vehicles shall be designed for the uniformly distributed live loads of Table 1607.1 or the following concentrated loads: (1) for garages restricted to vehicles accommodating not more than nine passengers, 3,000 pounds acting on an area of 4.5 inches by 4.5 inches; (2) for mechanical parking structures without slab or deck which are used for storing passenger vehicles only, 2,250 pounds per wheel.

b. The loading applies to stack room floors that support nonmobile, double-faced library bookstacks, subject to the following limitations:

1. The nominal bookstack unit height shall not exceed 90 inches;

2. The nominal shelf depth shall not exceed 12 inches for each face; and

3. Parallel rows of double-faced bookstacks shall be separated by aisles not less than 36 inches wide.

c. Design in accordance with the ICC *Standard on Bleachers, Folding and Telescopic Seating and Grandstands*.

d. Other uniform loads in accordance with an approved method which contains provisions for truck loadings shall also be considered where appropriate.

e. The concentrated wheel load shall be applied on an area of 20 square inches.

f. Minimum concentrated load on stair treads (on area of 4 square inches) is 300 pounds.

g. Where snow loads occur that are in excess of the design conditions, the structure shall be designed to support the loads due to the increased loads caused by drift buildup or a greater snow design determined by the building official (see Section 1608). For special-purpose roofs, see Section 1607.11.2.2.

h. See Section 1604.8.3 for decks attached to exterior walls.

i. Attics without storage are those where the maximum clear height between the joist and rafter is less than 42 inches, or where there are not two or more adjacent trusses with the same web configuration capable of containing a rectangle 42 inches high by 2 feet wide, or greater, located within the plane of the truss. For attics without storage, this live load need not be assumed to act concurrently with any other live load requirements.

j. For attics with limited storage and constructed with trusses, this live load need only be applied to those portions of the bottom chord where there are two or more adjacent trusses with the same web configuration capable of containing a rectangle 42 inches high by 2 feet wide or greater, located within the plane of the truss. The rectangle shall fit between the top of the bottom chord and the bottom of any other truss member, provided that each of the following criteria is met:

i. The attic area is accessible by a pull-down stairway or framed opening in accordance with Section 1209.2, and

ii. The truss shall have a bottom chord pitch less than 2:12.

iii. Bottom chords of trusses shall be designed for the greater of actual imposed dead load or 10 psf, uniformly distributed over the entire span.

k. Attic spaces served by a fixed stair shall be designed to support the minimum live load specified for habitable attics and sleeping rooms.

l. Roofs used for other special purposes shall be designed for appropriate loads as approved by the building official.

*m. **(Relocated from Table 16-B, 2001 CBC)** [For OSHPD 2] The minimum vertical design live load shall be as follows:*

Paper media:
12-inch-deep (305 mm) shelf 33 pounds per lineal foot (482 N/m)
15-inch-deep (381 mm) shelf 41 pounds per lineal foot (598 N/m), or
33 pounds per cubic foot (5183 N/m^3) per total volume of the rack or cabinet, whichever is less.
Film media:
18-inch-deep (457 mm) shelf 100 pounds per lineal foot (1459 N/m), or
50 pounds per cubic foot (7853 N/m^3) per total volume of the rack or cabinet, whichever is less.
Other media:
20 pounds per cubic foot (311 N/m3) or 20 pounds per square foot (958 Pa), whichever is less, but not less than actual loads.

Notation [For OSHPD]:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275 and 129850

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SECTION 1609 WIND LOADS

1609.1 Applications. Buildings, structures and parts thereof shall be designed to withstand the minimum wind loads prescribed herein. Decreases in wind loads shall not be made for the effect of shielding by other structures.

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1609.1.1 Determination of wind loads. Wind loads on every building or structure shall be determined in accordance with Chapter 6 of ASCE 7. The type of opening protection required, the basic wind speed and the exposure category for a site is permitted to be determined in accordance with Section 1609 or ASCE 7. Wind shall be assumed to come from any horizontal direction and wind pressures shall be assumed to act normal to the surface considered.
Exceptions:

1. Subject to the limitations of Section 1609.1.1.1, the provisions of SBCCI SSTD 10 shall be permitted for applicable Group R-2 and R-3 buildings.
2. Subject to the limitations of Section 1609.1.1.1, residential structures using the provisions of the AF&PA WFCM.
3. Designs using NAAMM FP 1001.
4. Designs using TIA/EIA-222 for antenna-supporting structures and antennas.
5. *[For OSHPD 2] Exception in Section 1609.4 shall apply to ASCE 7.*

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1609.4 Exposure category. For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. Account shall be taken of variations in ground surface roughness that arise from natural topography and vegetation as well as from constructed features.

Exception: ***(Relocated from 1619, 2001 CBC)*** *[For OSHPD 2] The wind design shall comply with Exposure C requirements unless the architect or structural engineer in general responsible charge can justify to the enforcement agency that the building site and surrounding terrain conform to the criteria for Exposure B. Minimum data to establish the exposure category shall be a topographic map (e.g., United States Geological Survey quadrangle maps) and aerial photographs except that for Exposure B sites located within urban areas, a vicinity map of sufficient size and scale to verify compliance may be provided.*

Notation [For OSHPD]:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275 and 129850

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SECTION 1612 FLOOD LOADS

1612.1 General. Within flood hazard areas as established in Section 1612.3, all new construction of buildings, structures and portions of buildings and structures, including substantial improvement and restoration of substantial damage to buildings and structures, shall be designed and constructed to resist the effects of flood hazards and flood loads. For buildings that are located in more than one flood hazard area, the provisions associated with the most restrictive flood hazard area shall apply.

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1612.3 Establishment of flood hazard areas. To establish flood hazard areas, the governing body shall adopt a flood hazard map and supporting data. The flood hazard map shall include, at a minimum, areas of special flood hazard as identified by the Federal Emergency Management Agency in an engineering report entitled "The Flood Insurance Study for [INSERT NAME OF JURISDICTION]," dated [INSERT DATE OF ISSUANCE], as amended or revised with the accompanying Flood Insurance Rate Map (FIRM) and Flood Boundary and Floodway Map (FBFM) and related supporting data along with any revisions thereto. The adopted flood hazard map and supporting data are hereby adopted by reference and declared to be part of this section.

*Exception: **[For OSHPD 2]** The flood hazard map shall include, at a minimum, areas of special flood hazard as identified by the Federal Emergency Management Agency's Flood Insurance Study (FIS) adopted by the local authority having jurisdiction where the project is located.*

1612.5 Flood hazard documentation. The following documentation shall be prepared and sealed by a registered design professional and submitted to the building official:

1. For construction in flood hazard areas not subject to high-velocity wave action:
1.1. The elevation of the lowest floor, including the basement, as required by the lowest floor elevation inspection in *Section 109.3.3, Appendix Chapter 1.*

1.2. For fully enclosed areas below the design flood elevation where provisions to allow for the automatic entry and exit of floodwaters do not meet the minimum requirements in Section 2.6.2.1 of ASCE 24, construction documents shall include a statement that the design will provide for equalization of hydrostatic flood forces in accordance with Section 2.6.2.2 of ASCE 24.

1.3. For dry floodproofed nonresidential buildings, construction documents shall include a statement that the dry floodproofing is designed in accordance with ASCE 24.

2. For construction in flood hazard areas subject to high-velocity wave action:
2.1. The elevation of the bottom of the lowest horizontal structural member as required by the lowest floor elevation inspection in *Section 109.3.3,Appendix Chapter 1.*

2.2. Construction documents shall include a statement that the building is designed in accordance with ASCE 24, including that the pile or column foundation and building or structure to be attached thereto is designed to be anchored to resist flotation, collapse and lateral movement due to the effects of wind and flood loads acting simultaneously on all building components, and other load requirements of Chapter 16.
2.3. For breakaway walls designed to resist a nominal load of less than 10 psf (0.48 kN/m^2) or more than 20 psf (0.96 kN/m^2), construction documents shall include a statement that the breakaway wall is designed in accordance with ASCE 24.

Notation [For OSHPD]:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275 and 129850

SECTION 1613 EARTHQUAKE LOADS

1613.1 Scope. Every structure, and portion thereof, including nonstructural components that are permanently attached to structures and their supports and attachments, shall be designed and constructed to resist the effects of earthquake motions in accordance with ASCE 7, excluding Chapter 14 and Appendix 11A. The seismic design category for a structure is permitted to be determined in accordance with Section 1613 or ASCE 7.

Exceptions:
1. Detached one- and two-family dwellings, assigned to Seismic Design Category A, B or C, or located where the mapped short-period spectral response acceleration, S_S, is less than 0.4 g.
2. The seismic-force-resisting system of wood-frame buildings that conform to the provisions of Section 2308 are not

required to be analyzed as specified in this section. *[For OSHPD 2] Not permitted by OSHPD, see section 2308.*
3. Agricultural storage structures intended only for incidental human occupancy.
4. Structures that require special consideration of their response characteristics and environment that are not addressed by this code or ASCE 7 and for which other regulations provide seismic criteria, such as vehicular bridges, electrical transmission towers, hydraulic structures, buried utility lines and their appurtenances and nuclear reactors.
5. [For OSHPD 2] Seismic Design Category shall be per exception to Section 1613.5.6.

1613.5.1 Mapped acceleration parameters. The parameters S_s and S_1 shall be determined from the 0.2 and 1-second spectral response accelerations shown on Figures 1613.5(1) through 1613.5(14). Where S_1 is less than or equal to 0.04 and S_s is less than or equal to 0.15, the structure is permitted to be assigned to Seismic Design Category A.

Exception: [For OSHPD 2] Seismic Design Category shall be per exception to Section 1613.5.6.

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1613.5.6 Determination of seismic design category. Occupancy Category I, II or III structures located where the mapped spectral response acceleration parameter at 1-second period, S_l, is greater than or equal to 0.75 shall be assigned to Seismic Design Category E. Occupancy Category IV structures located where the mapped spectral response acceleration parameter at 1-second period, S_1, is greater than or equal to 0.75 shall be assigned to Seismic Design Category F. All other structures shall be assigned to a seismic design category based on their occupancy category and the design spectral response acceleration coefficients, S_{DS} and S_{D1}, determined in accordance with Section 1613.5.4 or the site-specific procedures of ASCE 7. Each building and structure shall be assigned to the more severe seismic design category in accordance with Table 1613.5.6(1) or 1613.5.6(2), irrespective of the fundamental period of vibration of the structure, T.

TABLE 1613.5.6(1) SEISMIC DESIGN CATEGORY BASED ON SHORT-PERIOD RESPONSE ACCELERATIONS

VALUE OF S_{DS}	OCCUPANCY CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

TABLE 1613.5.6(2) SEISMIC DESIGN CATEGORY BASED ON 1-SECOND PERIOD RESPONSE ACCELERATION

VALUE OFS_{D1}	OCCUPANCY CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C

$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

Exception: [For OSHPD 2] Structures not assigned to seismic design category E or F above shall be assigned to seismic design category D.

1613.5.6.1 Alternative seismic design category determination. Where S_1 is less than 0.75, the seismic design category is permitted to be determined from Table 1613.5.6(1) alone when all of the following apply:
1. In each of the two orthogonal directions, the approximate fundamental period of the structure, T_a, in each of the two orthogonal directions determined in accordance with Section 12.8.2.1 of ASCE 7, is less than 0.8 T_s determined in accordance with Section 11.4.5 of ASCE 7.
2. In each of the two orthogonal directions, the fundamental period of the structure used to calculate the story drift is less than T_s.
3. Equation 12.8-2 of ASCE 7 is used to determine the seismic response coefficient, C_s.
4. The diaphragms are rigid as defined in Section 12.3.1 in ASCE 7 or for diaphragms that are flexible, the distance between vertical elements of the seismic-force-resisting system does not exceed 40 feet (12 192 mm).

Exception: [For OSHPD 2] Seismic design category shall be determined per exception to Section 1613.5.6.

1613.5.6.2 Simplified design procedure. Where the alternate simplified design procedure of ASCE 7 is used, the seismic design category shall be determined in accordance with ASCE 7.

Exception: [For OSHPD 2] Seismic design category shall be determined per exception to Section 1613.5.6.

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1613.6.1 Assumption of flexible diaphragm. Add the following text at the end of Section 12.3.1.1 of ASCE 7:

Diaphragms constructed of wood structural panels or untopped steel decking shall also be permitted to be idealized as flexible, provided all of the following conditions are met:

1. Toppings of concrete or similar materials are not placed over wood structural panel diaphragms except for nonstructural toppings no greater than $1^1/_2$inches (38 mm) thick.
2. Each line of vertical elements of the lateral-force-resisting system complies with the allowable story drift of Table 12.12-1.
3. Vertical elements of the lateral-force-resisting system are light-framed walls sheathed with wood structural panels rated for shear resistance or steel sheets.
4. Portions of wood structural panel diaphragms that cantilever beyond the vertical elements of the lateral-force-resisting system are designed in accordance with Section 2305.2.5 of the *California ~~International~~ Building Code*.

Notation [For OSHPD]:
Authority: Health and Safety Code Section 129850
Reference: Health and Safety Code Sections 1275 and 129850